

S-109

**STANDARD SPECIFICATIONS FOR MATERIALS AND THE
CONSTRUCTION OF CONCRETE CURBS, GUTTERS, SIDEWALKS,
DRIVEWAYS, ALLEYS, ALLEY APPROACHES, AND OTHER
CONCRETE STRUCTURES IN THE
CITY OF SANTA MARIA, CALIFORNIA**

SECTION 1. GENERAL REQUIREMENTS

The work herein provided for is to be done in accordance with the plans, profiles, cross-sections and general and special provisions on file with the Department of Public Works of the City of Santa Maria and with these specifications, which are intended to cover all items necessary for the complete construction of curbs, gutters, sidewalks, driveways, alleys, alley approaches and other concrete structures. No plans may be used unless signed by the City Engineer.

SECTION 2 MATERIAL REQUIREMENTS

A. PORTLAND CEMENT CONCRETE – TRANSIT READY-MIXED

1. Portland Cement Concrete shall be Transit-Ready-Mixed conforming to the appropriate ASTM Designation.
2. The allowable twenty-eight day (28) compressive strength for concrete shall not be less than the following:
 - a) Class A, (6 sacks) 3000 p.s.i.
 - b) Class B, (5-1/2 sacks) 2500p.s.i.
 - c) Class C, (5 sacks) 2500 p.s.i.
3. The Portland Cement, water, coarse and fine aggregate, shall comply with the applicable ASTM Designations for Portland Cement Concrete.
4. Proportioning of Portland Cement, water and coarse and fine aggregate shall be certified by the manufacturer to comply with ASTM Standards for each class specified.
5. Coarse aggregate grading shall conform to ASTM Designation C33-03 and as follows:

<u>Sieve Size</u>	<u>Percentage Passing</u>
1 1/2"	100
1"	95-100
1/2"	25-60
No. 4	0-10
No. 8	0-5

OR

1"	100
3/4"	90-100
3/8"	20-55
No. 4	0-10
No. 8	0-5

6. Fine aggregate grading shall conform to ASTM Designation C33-03 and as follows:

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/8"	100
No. 4	95-100
No. 8	80-100
No. 16.	50-85
No. 30	25-60
No. 50	5-30
No. 100	0-10

7. Concrete mixers and other equipment determined by the City Engineer not to be adequate or suitable for the work shall be removed and suitable equipment provided by the Contractor at his own expense. Pick-up and throw-over blades in the drum of the mixer which are worn down three-quarter inch (3/4") or more in depth shall be replaced by new blades. The size of batch in truck mixers shall not exceed the rated capacity as determined by the Standard Requirements of the Truck Mixer Manufacturers' Bureau. Truck mixers shall be equipped with means by which the number of revolutions of the drum or blades may be readily verified, and there shall be at least fifty (50) revolutions at mixing speed before any part of the batch is released.
8. The total elapsed time between the introduction of mixing water to the batch and depositing the complete mix shall not exceed 60 minutes.
9. Admixtures to prevent segregation, to improve workability or to accelerate the gain in strength of the concrete may be permitted, provided the admixture material and proportions proposed shall first be approved by the City Engineer. Admixtures shall not be used without written permission from the City Engineer or unless elsewhere provided for in these specifications or in the special provisions. Admixtures shall not be used to replace cement.

If the use of calcium chloride is permitted, it shall comply with the appropriate ASTM Designation. Unless otherwise specified or directed by the City Engineer, calcium chloride shall be added at the rate of two percent (2%) by weight of the cement. Calcium chloride shall be dissolved in water and then introduced with the mixing water.

Should the Contractor be permitted to use admixtures with the concrete for any purpose for his own benefit, he shall furnish such admixtures and incorporate them in the concrete mix at his own expense and no additional allowance will be made therefor.

To color the concrete add one and one-half pounds (1-1/2#) of lampblack per cubic yard, integrally mixed, or as specifically specified for other colors.

Air entraining agents may be used in compliance with the appropriate ASTM Designation and with approval of the City Engineer.

If the use of fly ash is permitted, it shall not exceed 25% of the amount of cement and with approval of the City Engineer.

10. The amount of water required for the proper consistency of concrete shall be as determined by the appropriate ASTM Designation.

The amount of the slump shall be twelve inches (12") minus the height after subsidence. The allowance for slump shall be not more than four inches (4").

The amount of water added at the mixer shall be regulated in accordance with the free water in the aggregates and the requirements for workability within the limits of the slump set forth above. The amount of water, including the free water in the aggregate, shall not exceed six and one-half (6-1/2) gallons per sack of cement in Class A concrete, seven (7) gallons per sack of cement in Class B concrete, or seven and one-half (7-1/2) gallons per sack of cement in Class C concrete.

11. Test Specimens may be taken by the City Engineer at any time deemed advisable from the transportation unit at the point of discharge and tested in conformance with the Standard Method of test for Compressive Strength of Molded Concrete cylinders, pursuant to the appropriate ASTM Designation.

B. EXPANSION JOINT MATERIAL

Prefabricated asphalt impregnated expansion joints, or equal, of three-eighth inch (3/8") thickness and of the same size and shape as those specified for the individual construction of curbs, gutters and sidewalks shall be fastened with staples or other approved type fastenings, into one unit to conform to the shape of the cross-section of the combination curb, gutter and sidewalk. The expansion joint shall be set flush with the face and to the full depth of the curb, gutter and sidewalk. They shall be placed at right angles and perpendicular to the forms at intervals of not more than thirty feet (30'). Expansion joints shall also be required at each end of a curb return, and at each end of constructed combination.

All structure expansion joints shall comply with Section 51-1.12 of the Standard Specifications.

C. CURING COMPOUND

Use of an approved curing compound conforming to the appropriate ASTM Designation shall be approved by the City Engineer.

SECTION 3 CONSTRUCTION METHODS

A. SUBGRADES FOR CONCRETE STRUCTURES

The subgrade shall be constructed true to grade and cross-section, as shown on plans, or as specified by the City Engineer or his authorized representative. The subgrade shall be thoroughly watered, rolled or hand tamped until hard and solid, before placing concrete. All adobe or soft and spongy material shall be removed to a depth as specified by the City Engineer and the resulting void shall be filled with earth, sand or gravel, free of any vegetation or other deleterious material and of a quality that will pack when moistened. The material shall be thoroughly watered and rolled or tamped in layers not to exceed eight inches (8"), until a firm and solid foundation is secured. The entire subgrade shall be tested for grade and cross-section by means of a templet extending the full depth and width of the curb, gutter or sidewalk and supported between side forms. The subgrade and forms shall be thoroughly watered in advance of placing concrete and allowed to dry to a damp condition. Compaction shall have a relative density of ninety percent (90%) under sidewalks and ninety-five percent (95%) under curbs, gutters and driveways, and other structures.

The work shall comply with all the requirements of the Standard Specification for Subgrade as defined under Section 40.

B. CONCRETE FORMS

1. The width of the forms for the combined curb, gutter and sidewalk shall be not less than the full thickness of the sidewalk on the outside edge of the sidewalk, not less than the full height of the curb face on the outside of the curb, and not less than the full thickness of the gutter on the outside edge of the gutter.
2. Timber forms, if used, shall not be less than one and five-eighths inches (1-5/8") thick after being surfaced. Warped forms and forms not having a smooth, straight upper edge shall not be used.
3. Rigid forms shall be provided for all curb returns except that benders or thin plank forms, rigidly placed may be used for curbs and curb returns where there are grade changes in the returns or where the central angle is such that a rigid form with a central angle of ninety degrees (90°) cannot be used.

4. Curb, gutter and sidewalk forms shall be carefully set to alignment and grade and to conform to the dimensions on the plan. Forms shall be held rigidly in place by the use of iron stakes at intervals not to exceed four feet (4'). Clamps, spreaders and braces shall be used where required to insure rigidity in the forms.
5. The form on the front of the curbs shall not be removed in less than two (2) hours nor more than six (6) hours after the concrete has been placed. In no event shall the form be removed while the concrete is sufficiently plastic to slump upon removal of form.
6. All forms shall be cleaned thoroughly each time they are used and coated with a light oil as often as necessary to prevent the concrete from adhering to them.
7. Forms for the structures shall comply with all provisions of Section 40 of the Standard Specifications.

C. EXPANSION JOINTS – See Expansion Joint Material Above

D. CONCRETE PLACEMENT

1. All concrete shall be of the class specified.
2. Any concrete that has had water added to the batch for more than 60 minutes shall be rejected and not placed in any structure. An interval of more than 45 minutes between any two consecutive batches or loads, or a delivery and placing rate of less than eight (8) cubic yards of concrete per hour shall constitute cause for shutting down work for the remainder of the day and, if ordered by the City Engineer, the contractor shall make, at his own expense, a construction joint at the location and of the type directed by the City Engineer in the concrete already placed.
3. Concrete shall be placed in the forms for curbs, gutters, sidewalks, driveways, alleys, alley approaches, and other structures, directly from the truck mixer, or as approved by the City Engineer in a manner which will not permit segregation of the concrete aggregates. Concrete shall be placed in the forms in layers not to exceed six inches (6") in depth until the forms are filled to the top. Each layer shall be thoroughly rodded to remove all rock pockets, or concrete may be compacted by means of a mechanical vibrator approved by the City Engineer. In addition, all flat slabs of sidewalks, driveways, alleys or alley approaches shall be struck off of proper section and grade and compacted with a grid of parallel metal bars until a layer of mortar not less than three-eighth inch (3/8") thick has been brought to the surface. The concrete shall then be given a final tamping with a light tamper consisting of wire mesh, having square openings not less than one-eighth inch (1/8") nor more than one-quarter

inch (1/4") in size. After tamping and floating, the proper section and grade shall be line and straight-edge checked to assure the designed finished line, grade and elevation that complete and adequate drainage will result.

4. Test specimens may be taken by the City Engineer at any time deemed advisable from the transportation unit at the point of discharge and tested in conformance with the Standard Method of Test for Compressive Strength of Molded Concrete Cylinders, pursuant the appropriate ASTM Designation.
5. Concrete placement for structures shall also comply with Section 51-1.09 of the Standard Specifications.
6. All concrete shall be protected from damages at the Contractor's expense, in compliance with Section 40 of the Standard Specifications.

E. CONCRETE FINISH

1. Sidewalks

The surface of the sidewalk shall be finished with a fine hair push broom drawn over the surface transverse to the line of traffic. Water, if necessary, may be applied lightly to the surface immediately in advance of brooming. Before brooming, the surface of the sidewalk shall be marked at right angles to the curb line and at a maximum of ten-foot (10') intervals. The mark shall be cut two inches (2") deep with a pointed trowel and then use a double edged tool which will make a groove one-quarter inch (1/4") in depth with one-eighth inch (1/8") rounded edges and insure a free movement weakened plain at the joint. Additionally, the sidewalk shall be marked at five-foot (5') intervals at right angles to the curb line using the aforementioned one-quarter inch (1/4") grooving tool, but deleting the two-inch (2") deep cut. Markings shall coincide and line up with adjoining curb markings, if any. The sidewalk shall also be edged with a suitable tool. The marking and grooving pattern shall be varied in such a way to include marks off the corners of any tree wells or other items constructed within the sidewalk. Uncontrolled cracking will not be acceptable.

When sidewalk to be constructed adjoins an existing sidewalk with a trowelled smooth finish, the finish of the sidewalk to be constructed shall conform with the finish of the existing sidewalk unless otherwise specified by the City Engineer.

All blemishes caused by the marking tool, edging tool, or any other blemish shall be removed by smooth troweling the surface prior to finishing with a broom.

The finished sidewalk shall be true to grade so that when a straight edge ten feet (10') in length is laid upon the surface of any point except at grade changes, the surface shall at no point vary more than one-eighth inch (1/8") and the finished surface shall be free from blemishes.

2. Curbs

Prior to the removal of the forms, the surface shall be edged with an approved type edging tool giving a corner radius of one-half inch (1/2").

The curb shall be given a smooth finish with a steel trowel, free from humps, sags, blemishes or other irregularities. When a straight edge ten feet (10') in length is laid on the top low line or face of the curb, the surface shall not vary more than one-eighth inch (1/8") from the straight edge except at grade changes or curves.

The top and front of the curb shall be marked at right angles to the curb line and at a maximum of ten-foot (10') intervals. The mark shall be cut two inches (2") deep with a pointed trowel and then use a double edged tool which will make a groove one-quarter inch (1/4") radii to the surface of the curb and insure a weakened plain at the mark. Markings shall coincide and line up with adjoining sidewalk markings, if any. Uncontrolled cracking will not be acceptable. After steel troweling and marking the front and top of the curb, it shall be given a final fine brush finish with the brush strokes parallel to the top of curb line.

When the top and face of the curb are finished and the specified time lapsed, the back form of the curb shall be removed and the back of the curb shall be finished the same as the top and face, to a depth of not less than two inches (2") below the curb top.

3. Gutters

After tamping, the gutter shall be finished with a wooden float to true grade from humps, sags, blemishes and other irregularities, so that when a straight edge ten feet (10') in length is placed upon the surface at any point, except at grade changes, the surface shall at no point vary more than one-eighth inch (1/8").

The surface of the gutter shall be marked the same as, and conform with, the markings on the curb. The gutter shall be edged on the outside edge with an approved type edging tool having a corner radius of one-half inch (1/2").

4. Driveways, Alleys and Alley Approaches

The finish surface of the sidewalk portion of the driveway shall be as per (1) above.

The approach or apron portion shall have a fiber broom finish transverse to the line of traffic. The curbs and gutter portions shall be finished as per (2) and (3) above.

5. Concrete structure finishes shall also comply with Section 51 of the Standard Specifications.

F. CURING CONCRETE

Use of pigmented curing compound shall be in accordance with the appropriate ASTM designation.

The curing period shall be for eight (8) days. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be broken or damaged before expiration of the curing period, the Contractor shall immediately apply liquid membranes over the damaged portions at his own expense.

Traffic shall not be permitted to pass over concrete structures or any loads imposed thereon in less than ten (10) days after the concrete has been placed.

G. CONTRACTOR'S NAME STAMPING

The Contractor shall stamp his name and the date (year) on all work done by him at intervals not to exceed two hundred feet (200') and not less than once on each job of less than two hundred feet (200') in length. The letters shall not be less than three quarters of an inch (3/4") in height and of a proportional width. They must be set into the work to a depth of not less than one-quarter inch (1/4").

H. RESPONSIBILITY FOR WORK

The Contractor shall repair at his own expense any damage to curbs, gutters, walks or other structures, caused by him in the performance of the work. Any construction or work performed not conforming to these specifications shall be removed and replaced at the Contractor's expense, and any damage caused by failure on the part of the Contractor for not properly protecting said construction, shall also be the Contractor's responsibility.

I. THICKNESS DEFICIENCY

Payment for concrete which is deficient in thickness of not more than 0.05 feet will be adjusted in compliance with Section 40-1.135A of the Standard Specification.

Concrete which is deficient in thickness of more than 0.05 feet will be removed in compliance with Section 40-1.135B of the Standard Specification.

J. CLASS OF CONCRETE

Class of Concrete

1. Sidewalks, Class C
2. Residential Driveways, Class B
3. Commercial Driveways, Class A
4. Curbs & Gutter, Class B
5. Cross Gutters & Spandrels,
Class A
6. Curb Only, Class B
7. Alleys & Alley Approaches,
Class A
8. Structures, Class A

Copies of City Standard Specification(s) and Drawing(s) can be obtained at the Engineering Division office at 110 S. Pine Street, Suite 221 (mail: Suite 101), Santa Maria, CA 93458-5082 or web site: www.ci.santa-maria.ca.us.

K. RAMPING CURBS AND SIDEWALKS

All curbs and sidewalks must be accessible to and usable by the physically handicapped. The laws requiring this are in Section 4450, Chapter 7, Division 5 of Title 1 of the Government Code and Section 19956.5 of the State Health and Safety Code.

Curb ramp details and island passage details shall comply with Caltrans Standard Plans RSP A88A, RSP A88B, and City Standard Drawing "Curb Ramp Detectable Warning Surface Detail."